

Computing Population Density

Population Density is the number of individuals in a specific area.

Population density can be written as an equation.

$$\text{Population density} = \frac{\text{Number of Individuals}}{\text{Unit Area}}$$

There are many ways to determine a population size. These include direct and indirect observations, sampling, and mark-and-recapture studies. In this lab, the drawing represent a forest ecosystem. The forest floor is the habitat of a mushroom known as the "mouse-eared toadstool." Your job is to determine the population density of this species by taking a census.

Procedure:

1. Trace the models of the three plots (square, circle, & rectangle) onto a sheet of plastic.
2. Place the model of the plot you chose at any location on the forest. Count the toadstools underneath the plastic and record the number in the chart on the following page. (**NOTE:** Please count those toadstools that are completely or mostly covered by the plastic. Do not count those toadstools that have only a small portion covered by the plastic.)
3. Repeat step 3, making a total of ten counts for each model (30 total). Make sure that each plot is in a new location. Be sure the count is recorded in the appropriate column of the chart.
4. Add the 10 numbers in each column and write the answers in the "Total" row of the chart.
5. Divide the total by 10 to determine the average number of toadstools per plot. Since each plot is one acre, the result is the average **population density** (number of toadstools per acre). Record the average population density in the "Average" column of the chart.
6. Using a pencil, draw a straight line (transect) across the forest model.
7. Place the length of the rectangular plot along the straight line(transect). Count the toadstools beneath the plastic using the method described in step 2 and record the number in the chart.
8. Move the plot to a new location along the transect and count the "toad stools" in a second plot. Record this as "Plot 2."
9. Repeat step 8 once more and record the results as "Plot 3."
10. Align the length of the rectangular plot along the opposite side of the transect. Count the toadstools beneath the plastic and record the number in the chart as "Plot 4."
11. Move the plot along the transect line as in steps 8 and 9. Record the toadstools in "Plots 5 and 6."
12. Add the numbers in the column and divide by 6 to determine the average population density for the sample census using the transect method.

Conclusions:

1. Was the census a true census or a sample census? _____
2. What was the smallest average population count? _____ toadstools per acre.
3. What was the largest average population count _____ toadstools per acre.
4. What is the population density determined by the transect method.
_____ toadstools per acre.
5. Does there appear to be a significant difference between the average population densities determined using the different plots? _____
6. The actual population density is 2.5 toadstools per acre. Is the estimate from the transect method closer to the actual population density? Explain your result. _____

7. All the plots are one acre in size. The total area of the forest is 49 acres. Calculate the estimated total population (number of toadstools in the forest) using the square, circular and rectangular plot. _____ square plot, _____ circular plot, and _____ rectangular plot.
8. Count the entire population of mouse-eared toadstools. Are the figures from your sample census close to the number of toadstools counted in the true census? _____
If not, suggest how the sample census method can be improved.

9. If you were asked to determine the population of dandelions in the school year, which method would you chose? _____

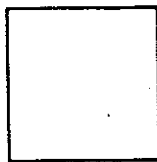
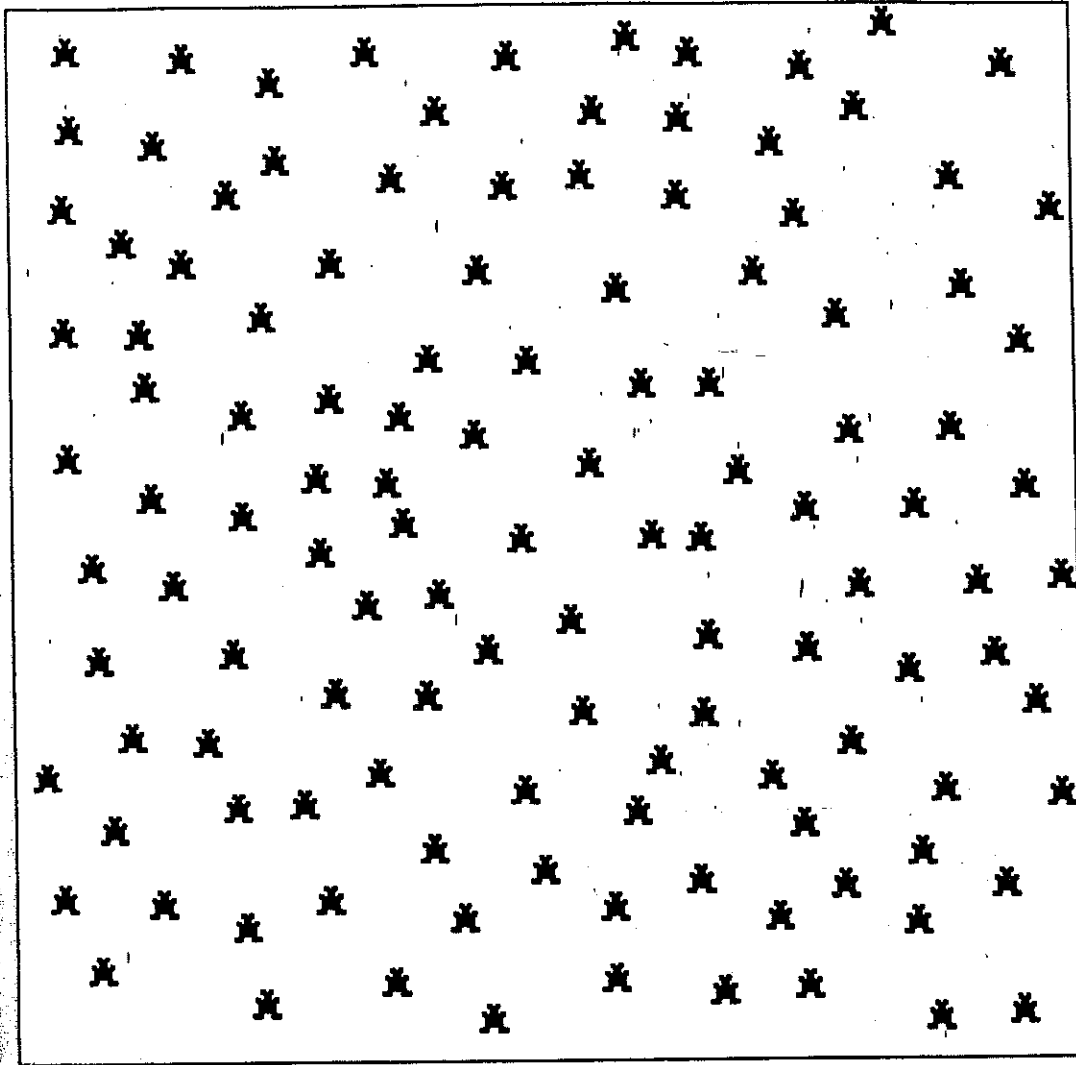
Explain why you chose this method. _____

Data and Analysis:

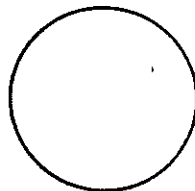
Plot Number	Location Randomly Selected			Plots along Transect
	Square	Circle	Rectangle	
1				
2				
3				
4				
5				
6				
7				_____
8				_____
9				_____
10				_____
Total				
Average				

Part I — A Sample Census

Forest Ecosystem Model Showing Mouse-eared Toadstools



Square Plot



Circular Plot



Rectangular Plot

Materials Needed:

Clear Plastic
Marking Pens
Calculators (optional)